

XLII.—*Objections to the Genera Pseudopygaulus, Coquand, Trachyaster, Pomel, and Ditremaster, Munier-Chalmas: their Species restored to Eolampas, Dunc. & Sladen, and Hemiaster, Desor.* By Prof. P. MARTIN DUNCAN, F.R.S., and W. PERCY SLADEN, F.G.S., Sec. Linn. Soc.

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List of Genera and Species, with Synonyms.

WE regret that we cannot agree to some alterations in the classification of the Echinoidea which have lately been made by our much respected friend and fellow-worker in the group, M. Cotteau.

M. Cotteau, without giving us the opportunity of debating the subject, has altered the generic position of some of the species of Echinoidea which we described in the 'Palæontologia Indica,' ser. xiv., Foss. Ech. of W. Sind and of Kach and Kattywar, 1882-85, has placed our names after the species in brackets, has introduced his own without that objectionable enclosure, and has published the alterations in the Pal. Franç. Éch. terr. Éocène, 1887.

I.

One of the most important of the alterations has been made in consequence of a misinterpretation of the law of priority of description and publication on the part of M. Cotteau, who, in his evident desire to do what he thought correct, has done us a wrong.

During the study of the Echinoidea of W. Sind we found some very remarkable species, which could not be placed in any genus which had been published up to that date, and the genus *Eolampas* was founded and published to receive them. A typical species was described and figured, besides others, and the work including them was published in 1882 and circulated widely (Pal. Ind. ser. xiv., Foss. Ech. W. Sind, p. 61).

In 1884 a genus *Petalaster* was diagnosed and published by M. Cotteau, with a typical species, in "Éch. nouv. ou peu connus," Bull. Soc. Zool. France, 1884, fasc. 3, p. 39. In

the author's remarks upon the genus it is evident that, although *Eolampas* covered the same ground, he was not aware of it.

In 1885 (*Éch. Foss. de l'Algér.* fasc. 9, p. 69) MM. Cotteau, Peron, and Gauthier admitted a genus *Pseudopygaulus*, Coquand, 1862, *Mém. de la Soc. Emul. de la Prov.* v. ii. Atlas, pl. xxxi. figs. 14–16, 1862, and *Petalaster*, Cotteau, 1884, was placed as a synonym. As we were aware by that time that *Petalaster* was a synonym of our *Eolampas*, although the fact had not become patent to the authors of the Algerian work, we naturally were anxious to know why *Petalaster* had been sacrificed, and especially as our researches had failed to find a definition of *Pseudopygaulus* anywhere. In the notice of the history of the genus *Pseudopygaulus* given by MM. Cotteau, Peron, and Gauthier (*op. cit.* p. 70) it turns out that up to the date of the publication of their work in 1885 there was no definition of the genus published! It is carefully stated that M. Coquand described the only species under the name *Catopygus Trigeri* (Coquand, *loc. cit.* p. 274). After the printing of the work was finished M. Coquand became aware that the species could not be placed in *Catopygus*, "et il se contenta, dans l'Atlas, à la légende de la planche, d'indiquer le nom générique de *Pseudopygaulus*. Il n'en a donné aucune diagnose, et n'a pas même consigné le fait dans un erratum." Although it was admitted that no diagnosis had been published and only the name had been appended to the plate of a species, the authors of the '*Éch. Foss. de l'Algérie*' thought it their duty to respect "ce titre de priorité."

In the *Pal. Franç. Éch. terr. Éocène*, 1887, p. 467 (livr. 12) the following is found:—

Pseudopygaulus, Coquand, 1862; Peron et Gauthier, 1885.

Eolampas, Duncan & Sladen, 1882.

Petalaster, Cott., 1884.

And M. Cotteau considers that *Eolampas* "doit être abandonné, comme le genre *Petalaster*, à cause de sa date plus récente." We demur to this proceeding, and decline most decidedly to give way. There is no instance on record where a "genus" has stood its ground without having been diagnosed and published; and it is a rule not to permit either species or genera to be considered of any value unless publication has occurred. MS. names and titles to species and genera do not carry weight or priority.

M. Coquand did not publish or diagnose *Pseudopygaulus* in 1862, and the genus was really published in 1885 in the work

of MM. Cotteau, Peron, and Gauthier, and therefore it ought to be abandoned together with *Petalaster*, because they have dates later than *Eolampas*.

EOLAMPAS, Duncan & Sladen (*op. cit.* p. 61), 1882.

Syn. *Petalaster*, Cotteau, 1884.

Pseudopygaulus, named by Coquand in 'Atlas,' 1862, published Cott., Peron, et Gauthier, 1885.

The species we published will therefore remain as we printed them, without our names in brackets and without the addition of the honoured name of M. Cotteau, who had nothing whatever to do with their description. The other species will be named *Eolampas Toucasi*, Cott. sp., *E. Trigeri*, Coquand sp., *E. buccalis*, Peron et Gauthier sp., and *E. Gauthieri*, Cott. sp. The terms *Pseudopygaulus* and *Petalaster* are of necessity extinct.

II.

M. Cotteau has changed the generic position of *Hemiaster Branderianus*, Forbes, *H. princeps*, Bittner, *H. Archiaci*, de Loriol, and *H. decipiens*, *H. apicalis*, *H. nobilis*, and *H. carinatus*, Duncan & Sladen, from Sind. All these species now stand in the genus *Trachyaster*, Pomel, and the names of the original describers are placed in brackets and the name of M. Cotteau follows. Two other species are also noticed. In the Pal. Franç. Éch. 1887, p. 400, it will be found that the following is the synonymy given:—

TRACHYASTER, Pomel, 1883.

Syn. *Hemiaster*, pars, Desor, 1847, 1858.

Periaster, pars, Desor, 1858.

M. Cotteau gives no other references, but remarks that *Trachyaster* is distinguished from *Hemiaster* of the Cretaceous epoch by the madreporite separating the posterior genital plates and the posterior ocular plates, and that it has four genital pores.

In the "Note sur la famille des Brissidées," Bull. de la Soc. Zool. de France, 1887, vol. xii. p. 561, M. Cotteau gives a short diagnosis of *Trachyaster*, but he does not mention as a type any one of the species noticed by M. Pomel in the work where the genus was first diagnosed. We are not informed how *Periaster*, Desor, is connected with *Trachyaster*;

but the connexion of this genus with *Hemiaster*, Desor, is impressed upon the reader.

Inasmuch as *Trachyaster* is a genus which was not foreseen by Forbes, Bittner, de Loriol, and Desor, which is said to be allied to *Hemiaster* and *Periaster*, while part of it forms a genus *Ditremaster*, and considering that not one species of it properly bears the name of M. Pomel after it, and that we are not informed concerning the typical species of the genus according to M. Pomel, the whole history of the genus requires, in our opinion, very decided criticism.

The genus will be found in Pomel, 'Thèses présentées à la faculté des Sciences de Paris,' 1883 (published at Algiers), p. 38. The first thing which strikes the student of this work is that *Trachyaster* is placed just before *Abatus*, Lovén, and *Palæostoma*, Lovén, and that it follows a new genus *Opissaster*, Pomel, which has two genital pores. Preceding the genus are *Moira*, *Schizaster*, &c., but there is no sign of *Hemiaster*, Desor. After the "Brissiens," which contain these genera, come the "Philobathidés," with *Aceste*; then come the Pourtalesiadæ, and then the "Progonastérides," and in a division of these—the "Pycnastérides"—we find *Pericosmus*, *Periaster*, a genus *Mecaster*, Pomel, and then *Hemiaster*. These Progonastérides form a subfamily differing from that in which *Trachyaster* occurs. It is clear, then, that according to M. Pomel there is a greater classificatory gap between that genus and *Hemiaster* than M. Cotteau supposes. On examining the diagnosis of *Trachyaster* and on comparing it with that of *Mecaster*, Pomel (*op. cit.* p. 42), their superfluity is evident.

The diagnosis is as follows:—" *Trachyaster*, Pomel. Globular, with the apex excentric behind; four pores (genital). Anterior ambulacrum simple, in a shallow groove, lost in front, and notching or not the test at the ambitus; petals depressed, unequal, oval or oblong, the anterior sometimes slightly flexuous at the summit. Peripetalous fasciole angular; peristome labiate, not very close to the margin. Periproct at the top of the posterior part, above a more or less marked depression. Tubercles close."

A very important statement is then made:—"The type is a fossil of the Upper Miocene [no name is given]; it is necessary to unite with this the greater part of the Tertiary *Hemiasters*, such as *H. nux*, *H. digonus*, *H. rotundus*, &c., which have the madreporite prolonged between the posterior ocular plates, and, probably, *H. gibbosus* and *H. zonatus* of the recent fauna."

We remark:—1. That a genus without a described type

species is good for nothing, and there is no type species to this one. 2. That the species mentioned as types do *not* present the generic characters of *Trachyaster*. *Hemiaster nux* has not four genital pores with the posterior basals separated by the madreporite; it has only two. It belongs, according to the method of M. Pomel, to the genus *Opissaster*, Pomel (*op. cit.* p. 37), and its synonym, *Ditremaster*, Munier-Chalmas, of which we shall write presently. *Hemiaster digonus* is well known to us, as it is a common species in Sind, and it has not four genital pores, so as to be a *Trachyaster*. The madreporite, moreover, does not always project between the ocular plates. Extraordinary as are these mistakes, those which follow are still more so, and simple want of observation will hardly explain the assertion that the madreporite is probably prolonged between the posterior ocular plates in *H. gibbosus* and *H. zonatus*. (M. Pomel forgets to place the name of A. Agassiz after these species.)

It is a positive fact that in *Hemiaster gibbosus*, A. Agassiz, the madreporite is restricted to the right anterior genital plate, and that it in no way passes between the posterior genital plates. It is a perfectly Ethmophract *Hemiaster*. The drawing of the apical system in the Report on the 'Challenger' Echini, pl. xx. *a* fig. 11, sets this matter beyond dispute. *Hemiaster zonatus*, A. Agassiz, is also drawn upon plate xx. *a* of the 'Challenger' Report, and there is absolutely no warrant for M. Pomel's doubt as to the nature of the apical system; the specimens are figured covered with their spines, and it is only the distinguished naturalist who has remarked upon the species that is in a position to know anything about it. But A. Agassiz remarks that the species only differs from *H. expergitus*, Lovén, in characters which are to be referred to age, and Lovén's species has most definitely the madreporite restricted as in *H. gibbosus*. A. Agassiz compares *H. zonatus* with *H. gibbosus*, and says nothing about an unusual extension of the madreporite.

It is indeed to be regretted that M. Pomel did not study the variations in the numbers of genital pores and the variable extension of the madreporite in individuals of some common recent species of Echinoidea. Had he done this he would have seen that no satisfactory generic characters are to be obtained from the number of pores and the size of the madreporite, all other structural characters being the same.

Neither M. Cotteau, M. Pomel, nor M. Munier-Chalmas, whose work we have to criticize shortly, appear to have studied the admirable work of Lovén, in his 'Etudes' and in his 'Pourtalesia' (Kongl. Svenska Vet.-Akad. Handl. Bd. x.

no. 7, 1883), regarding the variations in the apical system of Echinoidea, so we give a few extracts which may be readily verified.

The delineations are wonderfully correct and artistic in Lovén's 'Pourtalesia,' 1883, pl. xviii. Take first of all a specimen of *Spatangus purpureus* as large as many fossil *Hemiasters*, 16:15 millim., it has no genital pores; a slightly smaller one, 15:14 millim., has two genital pores and a madreporite; a specimen 24:21 millim. has only two genital pores; and one slightly smaller has one pore only and the madreporite has openings in the posterior basal (genital) plates besides along its course which separates the basals and posterior ocular (radial) plates. A specimen 23:22 millim. has four genital pores and the madreporite even extends into the posterior interradium. In *Brissopsis lyrifera* (Lovén, pl. xix.) a specimen 15:12 has two genital pores, but both are in the plates of the left side; a specimen 15:13 millim. has but one genital pore and that in the left posterior basal; a specimen 16:13 millim. has four genital pores, and one 42:28 millim. has only three genital openings, and there are isolated madreporic pores in the posterior interradium.

One of our species, *H. decipiens*, which we described in 1883 in the Ech. from Kach and Kattywar, Pal. Ind. ser. xiv. p. 34 (we give the reference because it was omitted by M. Cotteau), is now determined by M. Cotteau to be a *Trachyaster*, although he admits that the apical system is not visible! It so closely resembles *Linthia* in shape that we called it "decipiens;" but there is no lateral fasciole. The *Trachyasterian* characters are absolutely absent. We must confess that all this lax taxonomy does not appear scientific; but before leaving this part of the subject it is necessary to examine *Mecaster*, Pomel (*op. cit.* p. 42).

This genus is placed by M. Pomel immediately before *Hemiaster*, Desor, and in a different subfamily from *Trachyaster*, the sole difference between these so-called genera being that in *Mecaster* the madreporite separates the posterior ocular plates as well as the posterior genital plates!

It appears from M. Cotteau's article in the Pal. Franç. Éch. 1887, that he was aware of M. Gauthier's excellent article upon the impropriety of forming genera upon the position of the madreporite (Assoc. Franç. 1886, published 1887, p. 406) before altering the *Hemiasters* into *Trachyasters*. M. Gauthier's reasoning is incontrovertible as regards the genus *Hemiaster*, and he showed and delineated specimens of the same species in which the position of the madreporite was exceedingly variable. Yet this cogent reasoning is passed by.

We do not consider either *Trachyaster* or *Mecaster* in the light of genera or subgenera, and as we have noticed the errors associated with the first-named we place it out of the zoological pale. The whole of the species associated by M. Cotteau with *Trachyaster* must return into the genus *Hemiaster*, and therefore *Hemiaster decipiens*, Dunc. & Slad., *H. apicalis*, Dunc. & Slad., *H. nobilis*, Dunc. & Slad., and *H. carinatus*, Dunc. & Slad., 1884, *op. cit.* p. 198, are the correct generic and specific names.

III.

A considerable number of species of *Hemiaster* which were described by de Loriol, E. Forbes, Taramelli, Talavigne, Bouvé, Desor, and ourselves have been relegated to a genus *Ditremaster*, Munier-Chalmas, 1885, by M. Cotteau in the *Pal. Franç. Éch. terr. Éocène*, 1887, p. 411, and *Bull. Soc. Zool. de France*, 1887, p. 10. M. Cotteau has also placed two species which he had described as *Hemiaster* in this genus. One would have thought that a new genus which was to alter the classificatory position of some of the best known species of *Hemiaster*, and which by so doing conveyed a kind of stigma upon some experienced echinodermatists, would have been well placed before the biological world, published and fully illustrated, and that the essay would be accompanied by remarks explanatory of the reasons for antagonizing the opinions of Forbes and de Loriol. Moreover one would have thought that the description and argument would have been so well circulated that the students of the recent fauna might be informed concerning the new genus. We had much search after the new genus, and at last found it in *Comptes Rendus Acad. Sci.* 2 semestre, 1885, p. 1076, under the heading of "Distribution of genital openings":—"Genera with only two genital pores.—*Ditremaster*. *Hemiasternux*, which occurs in the Middle Eocene of the Alps, and which has always been accorded four pores, has really only two, situated in the posterior genital plates. *H. Covazii*, from the same formation in Istria, has the same number. It is probable that a great part, if not the whole, of the Eocene *Hemiasters* should be referred to *Ditremaster*." This is all.

There is not a single word of reference added upon the very considerable literature upon the subject of the species of *Hemiaster* with three and two genital pores, and *Tripylus* and *Abatus* are left out. There is no reference made to the *Palæostoma*-question or to that of the *Hemiasters* with two pores, by de Loriol and ourselves (see 'Palæontographica,' xxx. 1881,

and Ann. & Mag. Nat. Hist. 1884, xiv. p. 225). There is no reference to A. Agassiz's work in the 'Challenger' Report, and even M. Pomel is not noticed and his *Hemiaster*-genus with only two pores—*Opissaster* (*op. cit.* p. 37)—is passed by.

M. Cotteau, in Pal. Franç. 1887, Éch. terr. Éocène, p. 411, accepted this genus *Ditremaster* and attempted to improve it. It will be found that it is not such a simple genus as one might have expected, and M. Cotteau places as synonyms *Hemiaster* (*pars*) and *Trachyaster* (*pars*).

It appears that the reason of *Trachyaster* being in relation to *Ditremaster* must be from M. Pomel having jumbled up species of *Hemiaster* with two pores with those which have four, the madreporite in both instances passing backwards and separating the posterior ocular (radial) plates. This is satisfactory, because it indicates that *Trachyaster*, Pomel, is of no value. Having enlarged the diagnosis of *Ditremaster*, M. Cotteau altered the generic titles of the *Hemiasters* already referred to. The recent species appear to have escaped the memory of the distinguished palæontologist, and he has also neglected to refer to previous writers upon the subject. Otherwise he would not have altered the generic title of de Loriol's species; and we must believe that had he read our essay upon *Hemiaster elongatus*, which has two genital pores, he would have paid us the compliment of debating the matter. M. Cotteau must be aware of Prof. Sven Lovén's work upon the Ethmolyesian *Hemiasters*, and it is inconceivable that with all M. Cotteau's great experience, unequalled we might say, he should alter the generic title of species upon such slight foundation. In his first definition of *Hemiaster*, 1847, Desor made no reference to the number of genital pores or to the extension of the madreporite; and in our "Fossil Echinoidea of Sind, Kach, and Kattywar," in Pal. Ind. ser. xiv., we followed his example, and for the same reason that made that authority neglect the very variable characters—the number of pores and the extension of the madreporite. We have enlarged upon the distribution of these structures in other genera in a former page, and it is only necessary to refer to de Loriol, who considers that these species of *Hemiaster* with a smaller number of genital pores than the old Cretaceous types are members of a group of the genus. No one would classify these neonomous Ethmolyssii, to use Lovén's terminology, with the archæonomous ethmophract species; but they are still *Hemiasters*, for all the other characters are the same. To that opinion we adhere. It is necessary to point out that in the recent species *Hemi-*

aster cavernosus, A. Agassiz has described and drawn female specimens with two genital pores and an extended madreporite, the males having three pores ('Challenger' Report, 1881, pl. xx. a. fig. 19). According to the proposed generic changes females and males will be in different genera! It is difficult to understand how *H. Branderianus*, Forbes, can be a *Trachyaster* and also a *Ditremaster*, according to M. Cotteau. We cannot agree to the change of generic title of these species, and therefore we restore them to their previous position in *Hemiaster*.

IV.

The following is, in our opinion, the correct synonymy of the forms which we have considered in this communication:—

Genus EOLAMPAS, Dunc. & Sladen, 1882.

Syn. *Petalaster*, Cotteau, 1884.

Pseudopygaulus, Coquand (name without definition), 1862; Cott. 1885.

Eolampas Trigeri, Coquand, sp., 1862.

Eolampas buccalis, Peron et Gauthier, sp.

Eolampas Gauthieri, Cotteau, sp.

Eolampas Toucani, Cotteau, sp.

Eolampas antecursor, Dunc. & Sladen.

Eolampas excentricus, Dunc. & Sladen.

Genus HEMIASTER, Desor, 1847, et auctorum.

Syn. *Trachyaster*, Pomel, 1883.

Mecaster, Pomel, 1883.

Opissaster, Pomel.

Ditremaster, Munier-Chalmas.

Hemiaster Branderianus, Forbes.

Hemiaster princeps, Bittner.

Hemiaster Archiaci, de Loriol.

Hemiaster decipiens, Dunc. & Sladen.

Hemiaster apicalis, Dunc. & Sladen.

- Hemiaster nobilis*, Dunc. & Sladen.
Hemiaster gibbosus, A. Agassiz.
Hemiaster zonatus, A. Agassiz.
Hemiaster Bowerbanki, Forbes.
Hemiaster Prestwichi, Forbes.
Hemiaster digonus, d'Archiac.
Hemiaster elongatus, Dunc. & Sladen.
Hemiaster carinatus, Dunc. & Sladen.
Hemiaster cavernosus, Phil.

We have purposely omitted the subgenera *Abatus* and *Tripylus*.

September 1888.

XLIII.—*On some Remains of the Extinct Selachian Asteracanthus from the Oxford Clay of Peterborough, preserved in the Collection of Alfred N. Leeds, Esq., of Eyebury.* By A. SMITH WOODWARD, F.G.S., F.Z.S., of the British Museum (Natural History).

[Plate XII.]

SINCE the elaborate researches of Agassiz it has always been suspected that the dorsal fin-spines named *Asteracanthus* and the teeth named *Strophodus* originally pertained to one and the same fish; but no proof of the circumstance has been made known during the forty years that have elapsed since the publication of the 'Poissons fossiles,' and one of the commonest of Mesozoic fossils has thus remained undetermined among the miscellaneous group of "Ichthyodorulites." At last, however, it is satisfactory to be able to bring forward the requisite proof of this long-maintained surmise; and not only that, but also to make known some other important features in the anatomy of *Asteracanthus* which definitely decide its systematic position. Ample materials are furnished by the fine series of fossils from the Oxford Clay of Fletton, near Peterborough, in the collection of Alfred N. Leeds, Esq., of Eyebury; and I am indebted to the kindness of my friend for the pleasurable opportunity of studying these interesting specimens.